

## INVESTIGATION OF THE DANIEL WHALEN INCIDENT

REPORT

26 AUGUST 2015

### A. INTRODUCTION

On 8 November 2011 Daniel Whalen was preparing for his shift as a Lead Carman for CSX Transportation, Inc. While in the locker room, Whalen claims that when sat down in a Zody Task chair manufactured by Haworth, Inc. and sold by Office Environments Service, Inc., the seatback unexpectedly reclined rearward causing him to become unstable. He then fell forward in an effort to regain his balance. Whalen claims that he injured his neck during this incident.

The purpose of this investigation was to determine if the Zody Task chair is capable of generating the forces necessary to cause Whalen's claimed cervical spine injuries.

### B. AVAILABLE INFORMATION

1. Summons
2. Complaint
3. CSX Transportation, Inc. Answer
4. Summons on a Third-Party Complaint
5. Third-Party Complaint
6. Third-Party Answer and Counterclaim of Haworth, Inc.
7. Office Environments Service, Inc., Answer to Third-Party Complaint
8. Medical Records for Daniel Whalen
  - a. CVS Pharmacy
  - b. Dr. Andrew Ng
  - c. Dr. Barry Krosser
  - d. Dr. Michelle Gordon
  - e. Dr. Patrick Thomas
  - f. Northern West Chester Hospital
  - g. Dr. Joseph Annichiarico
  - h. Dr. Christian Piccolo
  - i. Dr. Daniel Klein
  - j. Hudson Valley Hospital Center
  - k. Lenox Hill Radiology
  - l. Northern West Chester Putnam Physical Therapy
  - m. Putnam Valley Pharmacy
  - n. Dr. Valerie Zarcone
  - o. Dr. John Abrahams
  - p. Dr. Moorjani

- q. Mt. Sinai Medical Center
  - r. Precision Imaging of New York
  - s. St. Joseph Medical Center
9. CSX Personal Injury Report D. Whalen, Injury Occurred November 8, 2011
  10. Transcript of the 16 January 2015 deposition of Daniel Whalen
  11. Transcript of the 6 February 2015 deposition of Joseph Kirchner with exhibits
  12. Transcript of the 1 April 2015 deposition of Joseph Kirchner with exhibits
  13. Transcript of the 11 May 2015 deposition of Robert Griggs
  14. Transcript of the 13 November 2011 recorded statement of Robert Griggs
  15. My 19 August 2015 inspection of an exemplar Zody Task chair

### C. DESCRIPTION OF CRASH

Whalen testified:

- He arrived at work around 5:40 AM. [DW 60-61]
- He got dressed and then sat down in the chair. [DW 62-63]
- He sat down with his hands on the armrests and leaned back in the chair. [DW 78]
- He expected nothing to happen when he did this. [DW 78, 219]
- He knew when he sat in the chair that the back of the chair could recline. [DW 82]
- He had previously sat in these chairs, leaned back and the seats had reclined. [DW 85]
- When he leaned back, it was as if the seat didn't have a back, his torso went back as if it had no support. [DW 87-88]
- "I believe my legs flew up in the air, my torso went back. When my torso stopped, I believe my head kept going, and then all of a sudden I was sitting up again, just like this." [DW 89]
- The chair went backwards, then the chair sprung forward which propelled him forward. [DW 220]
- "I was going backwards. When the chair sprung forward, it was pushing against my back. It had to be against my back." [DW 220]
- The chair forced him back up to an upright position. [DW 221]
- It didn't shoot him across the room. [DW 221]
- The chair pushed his body off the back of the chair as it returned to its original position. [DW 222]
- His back remained in contact with the chair as it pushed him forward. [DW 222]
- After the chair stopped, his body kept going a little bit but he remained in the chair. [DW 222]
- When the seat went back, his legs were fully extended out and off the ground. [DW 244]

Griggs testified:

- He usually arrives at 5 AM in order to be ready at 5:30 AM. [RG 11]
- He was present when something happened to Whalen. [RG 11]
- Whalen sat back, the chair reclined and he jerked himself forward. [RG 12-14]
- Whalen's entire motion was fluid, down and back. [RG 78-79]
- The chair was able to withstand Whalen's weight but Whalen wasn't expecting the seat to go backwards the way it did. [RG 97]
- Whalen went forward as a reaction to first going backward. [RG 97]

Kirchner testified:

- The chair went backwards, forwards, left, right, all the way around. [JK 56]
- Whalen appeared to regain his balance and then steady himself. [JK 56]
- Whalen did not go forward because his feet stabilized him. [JK 57]
- When Whalen came to rest he was seated upright looking straight ahead with his hands still holding onto the armrests. [JK 58]

According to Griggs' statement:

5           A You know peripheral vision, and he attempted to sit down  
6           in the chair and what made me turn all the way was because  
7           when he sat down I heard him, you know I heard him, "Oh!"  
8           you know he, he reared back in the chair, and the, and  
9           when I looked at the chair, the chair was almost on 2  
10          wheels, and he had, he jerked, he jerked forward to catch  
11          his self from falling cause the chair looked as though it  
12          was going to fall over because the chair has wheels on it,  
13          and is a concrete floor.

#### D. ANALYSIS

According to his medical records, Whalen was 58 years old, about 5'9" tall and weighed about 190 lbs.



Whalen was evaluated in the Emergency Department at Hudson Valley Hospital. The medical records state:

**DIAGNOSTICS:**

Patient: Whalen, Daniel A.      Ordering Physician: Jesse, Helma

\*\*\*\*\* FINAL REPORT \*\*\*\*\* Examination: Cervical spine, 3 views. Clinical Indication: Trauma and pain. Findings: AP, lateral and open-mouth views of the cervical spine include all 7 cervical vertebrae. There is no focal soft tissue swelling. There is loss of normal cervical lordosis. There is degenerative disc disease at C5-C6 and C6-C7 para-. There is no evidence for fracture or dislocation. The relationship of C1 and C2 appears normal and the odontoid is intact. Impression: 1. Loss of lordosis consistent with muscle spasm. 2. Degenerative disc disease. 3. No fracture. Dictated By: - 721470 Elliott Sumers, MD 20111108 1132 Signed By: - 721470 - Elliott Sumers, MD 20111108 1132

Whalen was diagnosed with neck strain and discharged to home later the same day.

Whalen followed up with Dr. Krosser on 16 November 2011. On exam, he was able to move his neck with some limitation in extension and right axial rotation. Whalen had sensation in the hand, good grip strength and good strength around his elbow. He reported that the intermittent numbness in his right arm was mostly resolved. Dr. Krosser reviewed x-rays and an MRI of Whalen's cervical spine and noted that that Whalen had degenerative disease at C5-C6 and C6-C7. Dr. Krosser also noted that the patient did not have any direct trauma, but just twisted his neck and was experiencing some inflammation.

On 20 April 2012, Whalen underwent a two-level anterior cervical discectomy and fusion at C5-C6 and C6-C7. These two levels were noted to be degenerative based upon x-ray imaging on the date of the incident (8 November 2011). During the surgery, it was noted that Whalen had a large osteophyte (a bony outgrowth associated with the degeneration of articular surfaces) at the C5-C6 level along with posterolateral disc herniations on the left.

Biomechanics is comprised of bio, meaning living tissue, and mechanics, the classic engineering study of loading. Biomechanics is the science that deals with the time and space response characteristics of biologic solids (biosolid mechanics), fluids (biofluid mechanics), and viscoelastic materials (living tissue) to imposed internal and external forces. It is classified as engineering studies of mechanics associated with the interface of loads on rigid and nonrigid bodies, and the behavior of bodies (physiologic systems) under loading.

There are three basic types of loading: tension (pulling), compression (crushing), and shear (smearing). All other modes of loading are combinations of these three basic modes. For example, in bending, the material on the outside of the bend is in tension, while the material on the inside of the bend is in compression.

Traumatic injuries of the intervertebral discs of the cervical and lumbar spine result from excessive bending and shear loads applied to the spine. During forward bending, the discs between the vertebral bodies undergo a combination of compression and tension. The front or anterior portion of the disc is compressed or squished while the posterior portion of the disc undergoes tension or stretching. The compression, in addition to the bending, forces the jelly

(nucleus) in the center of the disc backward (like squeezing a water balloon). Disc herniations are frequently observed along the posterior or posterolateral aspect of the disc. This is because the posterior elements of the vertebra limit the degree of extension of the individual levels as compared to the amount of flexion allowed at each level.

Degeneration of the spine, whether it be degenerative disc disease and/or degenerative joint disease, is commonly part of the aging process. Disc degeneration is a cascade of events that result in structural and cellular changes in the annulus and nucleus. Most notably, the gelatinous nucleus begins to dry out and becomes more fibrous in nature and the fibrous network of the annulus becomes less organized. The degenerative changes of the intervertebral disc are commonly accompanied by degenerative changes in the surrounding vertebral bone structures including but not limited to osteophyte formation and hypertrophy of the associated facet joints. The arthritic changes of the facet joints and deposition of excessive bone are not caused traumatically. Rather, these are anatomic changes that occur over a longer period of time and are indicative of a chronic degenerative process. However, the intervertebral discs of a degenerated spine can still be traumatically injured if the applied loads are of sufficient magnitude and in the appropriate direction.

Newton's laws of physics apply to all objects, including the human body. Newton's first law states the every body at rest will remain at rest, and any body in motion will remain in motion at a constant velocity, unless acted on by an outside force. Newton's laws are applicable to understanding the behavior of Whalen's body while in the chair.

Whalen, Griggs and Kirchner all testified that Whalen sat in the chair, he leaned rearward and that the reclining of the seatback was unexpected by Whalen. As Whalen applied his body weight to the seatback, the seatback was able to resist the weight of Whalen's body. The seatback just didn't offer as much resistance as Whalen was expecting. However, Whalen's posterolateral disc herniations for which he was surgically treated, were not caused by any uncontrolled extension resulting from the rearward motion of Whalen's body. During extension, the posterolateral aspect of his cervical intervertebral discs would have been under compression (not the tensile loading which causes disruption of the fibrous matrix leading to disc herniations). Had the rearward motion of his body resulted in cervical spine injuries, Whalen should have sustained anterior disc herniations or strain/disruption of the ligamentous or muscular structures along the anterior (front) of his cervical spine.

The bending loads on Whalen's cervical spine during his rearward motion were not in the correct direction to cause injury to or exacerbate the pre-existing conditions of his cervical spine intervertebral discs for which he was diagnosed and surgically treated.

Whalen also testified that after reclining rearward, the seatback of the chair pushed his body forward propelling his body forward. The seatback of the chair could not have propelled his body forward as testified to by Whalen. My inspection of an exemplar Zody Task chair revealed that when seated in the chair with the seatback in the unlocked position and with the minimal resistance set, the seatback is balanced with the applied bodyweight from the individual seated



in the chair. The seatback is unable to overcome the weight of the person sitting in the seat so as to accelerate them forward. This observation is consistent with the testimony of Griggs and Kirchner. Griggs and Kirchner testified that Whalen's forward motion was his reaction to his unexpected rearward motion.

Whalen was not propelled forward by the chair as he claims.

Cadaveric studies are utilized extensively in the biomechanical literature to elucidate the causation and propagation of injuries under various loading conditions. Cadaveric studies have reported cervical disc failures with bending loads of 168 in-lbs to 238 in-lbs.<sup>1</sup> These studies used samples retrieved from males and females of age and degrees of disc degeneration comparable to Whalen.

The bending loads on cervical spine during an acceleration/deceleration event can be calculated using the Conservation of Energy Principles and Newton's Laws of Physics. For a conservative estimate and using:

- A pulse duration of 0.1 seconds and 1.0 seconds
- A 6 inch vertical distance from the base of the head to the lower cervical spine levels
- Head weight of 10 lbs

For the bending loads on Whalen's cervical spine to have been sufficient to cause a posterior disc herniation, Whalen would have had to accelerate his body to at least 6 MPH in about 0.1 seconds or 60 MPH in 1 second just using his own muscle forces.

Neither the incident as described, nor the Zody Task chair are able to produce the magnitude of forces necessary to accelerate Whalen's body forward to cause injury to or exacerbate the pre-existing conditions of his cervical spine intervertebral discs for which he was diagnosed and surgically treated.

The results of my biomechanical analysis of Whalen's injuries are consistent with the medical diagnoses by Dr. Krosser who noted that Whalen did not have any direct trauma, but just twisted his neck and was experiencing some inflammation.

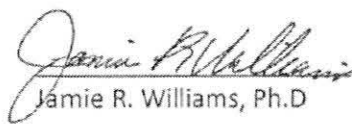
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<sup>1</sup> *Comparative Strengths and Structural Properties of the Upper and Lower Cervical Spine in Flexion and Extension*, Nightingale RW, Winkelstein BA, Knaub KE, Richardson WJ, Luck JF, Myers BS, *Journal of Biomechanics* 35: 725-732, 2002.

E. FINDINGS

Within the bounds of reasonable technical certainty, and subject to change should additional information become available, it is my professional opinion that:

1. Whalen was not propelled forward by the chair as he claims.
2. The bending loads on Whalen's cervical spine during his rearward motion were not in the correct direction to cause injury to or exacerbate the pre-existing conditions of his cervical spine intervertebral discs for which he was diagnosed and surgically treated.
3. Neither the incident as described, nor the Zody Task chair are able to produce the magnitude of forces necessary to accelerate Whalen's body forward to cause injury to or exacerbate the pre-existing conditions of his cervical spine intervertebral discs for which he was diagnosed and surgically treated.
4. The results of my biomechanical analysis of Whalen's injuries are consistent with the medical diagnoses by Dr. Krosser who noted that Whalen did not have any direct trauma, but just twisted his neck and was experiencing some inflammation.

  
Jamie R. Williams, Ph.D